I U C L I D

Data Set

Existing Chemical	:	ID: 220352-35-2
CAS No.	:	220352-35-2
TSCA Name	:	butylated triphenyl phosphate

Producer Related Part

Company	:	Akzo Nobel Functional Chemicals
Creation date	:	18.03.2001

Substance Related Part

Company	:	Akzo Nobel Functional Chemicals
Creation date	:	18.03.2001
Memo	:	
Printing date	:	02.08.2001
Revision date	:	
Date of last Update	:	02.08.2001
Number of Pages	:	224
Chapter (profile)	:	Chapter: 1, 2, 3, 4, 5, 7
Reliability (profile)	:	Reliability: without reliability, 1, 2, 3, 4
Flags (profile)	:	Flags: without flag, confidential, non confidential, WGK (DE), TA-Luft (DE), Material Safety Dataset, Risk Assessment, Directive 67/548/EEC, SIDS

1.0.1 OECD AND COMPANY INFORMATION

Type	:	cooperating company
Name	:	Akzo Nobel Functional Chemicals
Partner	:	
Date	:	
Street	:	5 Livingstone Avenue
Town	:	Dobbs Ferry, NY 10522
Country	:	United States
Phone	:	
Telefax	:	
Telex	:	
Cedex	:	

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1.0.2 LOCATION OF PRODUCTION SITE

Name of Plant	:	Akzo Nobel Funcrional Chemicals LLC
Street	:	P.O. Box 1721
Town	:	Gallipolis Ferry, WV 25515-5721
Country	:	United States
Phone	:	304-675-1150
Telefax	:	
Telex	:	
Cedex	:	

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1.0.3 IDENTITY OF RECIPIENTS

1.1 GENERAL SUBSTANCE INFORMATION

Substance type	:	organic
Physical status	:	liquid
Purity	:	= 75 - 80 % w/w
Reliability	:	(1) valid without restriction

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1.1.0 DETAILS ON TEMPLATE

1.1.1 SPECTRA

1.2 SYNONYMS

t-butylphenyl diphenyl phosphate
Reliability : (1) valid without restriction
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t-butylphenyl phenyl phosphate
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1.3 IMPURITIES

CAS-No	:	115-86-6
EINECS-No	:	204-112-2
EINECS-Name	:	triphenyl phosphate
Contents	:	= 20 - 25 % w/w
Reliability	:	(1) valid without restriction

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1.4 ADDITIVES

1.5 QUANTITY

1.6.1 LABELLING

Labelling	:	provisionally by manufacturer/importer
Symbols	:	N
Nota	:	
Specific limits	:	
R-Phrases	:	(50) Very toxic to aquatic organisms
S-Phrases	:	(3/9) Keep in a cool, well-ventilated place

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1.6.2 CLASSIFICATION

Classification	:	
Class of danger	:	dangerous for the environment
R-Phrases	:	(50) Very toxic to aquatic organisms
Reliability	:	(1) valid without restriction

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1.7 USE PATTERN

Type	:	industrial
Category	:	Basic industry: basic chemicals
Reliability	:	(1) valid without restriction

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1.7.1 TECHNOLOGY PRODUCTION/USE

Type	:	Production

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1.8 OCCUPATIONAL EXPOSURE LIMIT VALUES

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1.9 SOURCE OF EXPOSURE

Memo : During production and use
Reliability : (1) valid without restriction
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1.10.1 RECOMMENDATIONS/PRECAUTIONARY MEASURES

Type : Handling
Remark : Wear protective clothing including chemical goggles and rubber gloves whenever handling this product to avoid eye and skin contact. Avoid inhaling vapor or mist. Wash thoroughly after handling.
Reliability : (1) valid without restriction
29.05.2001

Type : Storage
Remark : Store away from foodstuffs and animal feed. Containers should be stored in cool, dry, well ventilated area aware from flammable or oxidizing substances. Keep away from sources of flame and heat. Carbon steel is the preferred material of construction for storage containers.
03.05.2001

Type : Fire
Remark : This product is not classified as flammable or combustible. It is self-extinguishing once the source of ignition is removed. It may decompose under fire conditions.
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1.10.2 EMERGENCY MEASURES

Type : accidental spillage
Remark : Isolate area and restrict access. Dike area to prevent spreading. Soak up product with a suitable absorbent such as clay or sawdust. Place absorbed material in chemical waste container.
Reliability : (1) valid without restriction
29.05.2001

Type : injury to persons (skin)
Remark : Remove contaminated clothing. Thoroughly wash all affected areas with soap and water. Get medical attention if irritation persists.
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Type : injury to persons (eye)
Remark : Immediately flush eyes with plenty of water. If wearing contact lenses, remove them. Hold eyelids apart during flushing to ensure rinsing the entire surface of the eye. Get medical attention if irritation persists.
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Type : injury to persons (inhalation)
Remark : If inhaled, remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
03.05.2001

Type : injury to persons (oral)

Remark : Get medical attention or call a poison control center. Do not induce vomiting unless directed to do so by medical personnel.

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1.11 PACKAGING

Memo : Shipped in carbon steel bulk and drum containers
Reliability : (1) valid without restriction
29.05.2001

1.12 POSSIB. OF RENDERING SUBST. HARMLESS

1.13 STATEMENTS CONCERNING WASTE

Memo : Any amount not used should be disposed of in accordance with all applicable regulations.
Remark : This product does not meet EPA's criteria of a hazardous waste.
Reliability : (1) valid without restriction
29.05.2001

1.14.1 WATER POLLUTION

1.14.2 MAJOR ACCIDENT HAZARDS

1.14.3 AIR POLLUTION

1.15 ADDITIONAL REMARKS

1.16 LAST LITERATURE SEARCH

Type of Search : External
Chapters covered : 5
Date of search :
29.05.2001

1.17 REVIEWS

1.18 LISTINGS E.G. CHEMICAL INVENTORIES

Type : TSCA
Additional info :
Reliability : (1) valid without restriction
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2.1 MELTING POINT

2.2 BOILING POINT

Value : = 260 ° C at 13.3 hPa
Reliability : (2) valid with restrictions
20.07.2001

2.3 DENSITY

Type : relative density
Value : = 1.17 at 20° C
Method :
Year :
GLP : no
Test substance : as prescribed by 1.1 - 1.4
Reliability : (2) valid with restrictions
30.05.2001 (1)

2.3.1 GRANULOMETRY

2.4 VAPOUR PRESSURE

Value : = .13 hPa at 155° C
Reliability : (2) valid with restrictions
20.07.2001

2.5 PARTITION COEFFICIENT

Log pow : = 5.12 at 25° C
Method
Year : 1979
GLP : no
Test substance : as prescribed by 1.1 - 1.4
Reliability : (2) valid with restrictions
02.08.2001 (13)

2.6.1 WATER SOLUBILITY

Value : = .04 other: ug/ml at 25 ° C
Qualitative : of very low solubility
Pka : at 25 ° C
PH : at and ° C
Method : OECD Guide-line 105 "Water Solubility"
Year : 2000
GLP : no
Test substance : as prescribed by 1.1 - 1.4
Reliability : (1) valid without restriction
30.05.2001 (1)

2.6.2 SURFACE TENSION

2.7 FLASH POINT

Value	:	= 246.1 ° C
Type	:	closed cup
Method	:	other: Pensky-Martens Closed Cup
Year	:	
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Reliability	:	(1) valid without restriction

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2.8 AUTO FLAMMABILITY

2.9 FLAMMABILITY

2.10 EXPLOSIVE PROPERTIES

Result	:	not explosive
Reliability	:	(1) valid without restriction

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2.11 OXIDIZING PROPERTIES

2.12 ADDITIONAL REMARKS

3.1.1 PHOTODEGRADATION

Type	:	water
Light source	:	Sun light
Light spect.	:	nm
Rel. intensity	:	based on Intensity of Sunlight
Conc. of subst.	:	10 mg/l at 28 degree C
Direct photolysis		
Halflife t1/2	:	> 14 day
Degradation	:	% after
Quantum yield	:	
Deg. Product	:	
Method	:	
Year	:	1981
GLP	:	yes
Test substance	:	as prescribed by 1.1 - 1.4
Method	:	The test substance was evaluated for photodegradation in both natural water (Mississippi river water)and purified water. Four tubes were used for zero time analysis, eight tubes were mounted for direct sunlight exposure, and eight tubes were used as the dark controls. During direct sunlight exposure, the average maximum temperature was 28 degrees C and the average minimum was 18 degrees C. The water was sampled on days 2, 5, 9, and 14. Water samples were extracted with hexane and analyzed by gas chromatography using a nitrogen-phosphorus selective detector. Blank water samples were run concurrently.
Result	:	There is no detectable direct or sensitized photolysis or non-photolytic losses during the 14 day test period. These results indicate that neither photolysis nor chemical transformation processes such as hydrolysis are likely to be significant in an aqueous environment.
Reliability	:	(1) valid without restriction

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3.1.2 STABILITY IN WATER

3.1.3 STABILITY IN SOIL

3.2 MONITORING DATA

3.3.1 TRANSPORT BETWEEN ENVIRONMENTAL COMPARTMENTS

3.3.2 DISTRIBUTION

3.4 MODE OF DEGRADATION IN ACTUAL USE

3.5 BIODEGRADATION

Type	:	aerobic
Inoculum	:	other: microorganisms naturally occurring in river water

Concentration	:	50µg/l related to Test substance 500µg/l related to Test substance
Contact time	:	27 day
Degradation	:	% after
Result	:	
Deg. Product	:	
Method	:	
Year	:	1982
GLP	:	
Test substance	:	as prescribed by 1.1 - 1.4
Method	:	This study utilized the river die-away test method which measured the die-away or decrease in concentration of the test substance over time in Mississippi River water in sealed bottles. River water was collected, transferred to a 5 gallon glass carboy, and aerated until placed on test. Replicate solutions contained either 50 or 500 ppb of the test substance. Fifteen bottles of each concentration contained the active river water whereas five bottles at each concentration contained membran-filtered water. In addition, five bottles containing river water and 500 ppb test substance were autoclaved. All sample bottles were kept in the dark at ambient temperature (24 degrees C). Samples were analyzed at preset times. Bottles containing just river water were prepared and used to assay the microbial population. Quadruplicate plates were enumerated after incubation for 48 hours at 35 degrees C. The amount of test substance present was determined by a gas chromatography method using a nitrogen-phosphorus selective detector.
Result	:	The half life of the butylated triphenylphosphate in the spiked water samples was less than 0.5 days for the 50 ppb and for the 500 ppb samples in river water. The material was so rapidly lost that there were insufficient number of data points for use of the statisitcal method of half life analysis. In contrast, the half life in the autoclaved water was about 39 days. This indicates that biotransformation is the important process and that contribution from hydrolysis or from other physcial processes were not significant. Degradation in the membrane-filtered water was still relatively rapid, primarily because of bacterial contamination.
Reliability	:	(2) valid with restrictions

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3.6 BOD5, COD OR BOD5/COD RATIO

3.7 BIOACCUMULATION

3.8 ADDITIONAL REMARKS

4.1 ACUTE/PROLONGED TOXICITY TO FISH

Type	:	flow through
Species	:	Salmo gairdneri (Fish, estuary, fresh water)
Exposure period	:	96 hour(s)
Unit	:	mg/l
Analytical monitoring	:	no
NOEC	:	c = 2.5
LC50	:	c = 13.7
Method	:	other: Committee on Methods for Toxicity Tests with Aquatic Organisms, EPA 660/3-75-009, 1975
Year	:	1979
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Method	:	Groups of rainbow trout were exposed to one of five concentrations (1.3, 2.5, 5.0, 10.0, and 20.0 mg/l) of the test substance. The water was analyzed to assure correct pH, dissolved oxygen, hardness, alkalinity, and other parameters. A non-treated control group was included in the study. Ten fish per group were exposed for 96 hours. The LC50 and 95% confidence limits were calculated using the Spearman-Karber method. The fish were observed daily for abnormal behavior which was recorded.
Result	:	The 96 hour LC50 was calculated to be 13.7 mg/l with 95% confidence limits of 12.0 to 15.8 mg/l. The 96 hour NOEC is 2.5 mg/l. Higher doses produced various behavioral signs, including quiescence, irritation, erratic swimming, and labored respiration. These symptoms were more severe in the higher dose groups, demonstrating a dose-response relationship.
Conclusion	:	The 96 hour LC50 is 13.7 mg/l, with 95% confidence limits of 12.0 to 15.8 mg/l. The NOEC is 2.5 mg/l.
Reliability	:	(2) valid with restrictions

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Type	:	other: static-renewal
Species	:	Cyprinodon variegatus (Fish, estuary, marine)
Exposure period	:	96 hour(s)
Unit	:	mg/l
Analytical monitoring	:	yes
NOEC	:	m = 1
LC50	:	c > 1
Method	:	OECD Guide-line 203 "Fish, Acute Toxicity Test"
Year	:	1996
GLP	:	yes
Test substance	:	as prescribed by 1.1 - 1.4
Reliability	:	(1) valid without restriction

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4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

Type	:	static
Species	:	Mysidopsis bahia (Crustacea)
Exposure period	:	96 hour(s)
Unit	:	mg/l
Analytical monitoring	:	yes
NOEC	:	c = .22
EC50	:	c = .39
Method	:	OECD Guide-line 202, part 1 "Daphnia sp., Acute Immobilisation Test"
Year	:	1996
GLP	:	yes

Test substance	:	as prescribed by 1.1 - 1.4
Method	:	A preliminary rangefinding test was conducted to determine the solubility of the test substance in seawater and to identify appropriate dose levels. Since 100% mortality was obtained at 1.0 mg/l nominal concentration and lethergy was observed at nominal 0.5 mg/l, the doses chosen were nominal concentrations of 0.13, 0.22, 0.36, 0.60, and 1.0 mg/l. In the definitive test, the pH, salinity, dissolved oxygen concentration, and temperature were measured. The comparative measured concentrations were 0.093, 0.090, 19, 0.50, and 0.23 mg/l. However, analysis of quality control samples resulted in measured concentrations which ranged from 97.2 to 120% of the nominal concentrations. Observations were made daily for behavior anomalies.
Result	:	Throughout the exposure period, there was no visible sign of undissolved test substance (e.g., no precipitate, surface film) in any of the exposure solutions. The high nominal dose of 1.0 mg/l caused 100% mortality. At 96 hours, the 0.36 and 0.60 mg/l exposure concentrations caused 40 and 95% mortality, respectively. No mortality or sublethal effects were observed in the mysids exposed to mysids exposed to either 0.13 and 0.22 mg/l. The 96 hour LC50 was calculated by probit analysis to be 0.39 mg/l, with 95% confidence interval of 0.34 to 0.44 mg/l. The NOEC was found to be 0.22 mg/l.
Conclusion	:	The nominal 96 hour LC50 is 0.39 mg/l, with a 95% confidence interval of 0.34 to 0.44 mg/l. The NOEC is 0.22 mg/l.
Reliability	:	(1) valid without restriction

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4.3 TOXICITY TO AQUATIC PLANTS E.G. ALGAE

Species	:	Selenastrum capricornutum (Algae)
Endpoint	:	other: chlorophyll
Exposure period	:	96 hour(s)
Unit	:	mg/l
Analytical monitoring	:	
EC50	:	c = 2.6
Method	:	The phytotoxicity of the test substance was determined in the freshwater green alga, Selenastrum capricornutum, over a period of 96 hours. Doses used in this definitive test were based on the results of a rangefinding test. The measured endpoint is the decrease in chlorophyll in the treated cultures as compared to the control cultures. The second endpoint measured is the concentration that causes a 50% decrease in cell numbers. Triplicate cultures were used for all test concentrations and for the control group. Chlorophyll was measured fluorometrically. Cells were counted with a hemacytometer and a microscope.
Result	:	Based on a decrease in the amount of chlorophyll present, the 96 hour EC50 was determined to be 3.0 ppm with 95% confidence limits of 1.5-6.3 ppm. The calculated EC50 based on a decrease in cell number was 2.6 ppm with 95% confidence limits of 1.0-7.0 ppm
Reliability	:	(2) valid with restrictions

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4.4 TOXICITY TO MICROORGANISMS E.G. BACTERIA

4.5.1 CHRONIC TOXICITY TO FISH

4.5.2 CHRONIC TOXICITY TO AQUATIC INVERTEBRATES

Species	:	Daphnia magna (Crustacea)
Endpoint	:	other: reproduction and mortality
Exposure period	:	
Unit	:	µg/l
Analytical monitoring	:	yes
NOEC	:	m <= 40
LCEC	:	c < 100
Method	:	
Year	:	1979
GLP	:	yes
Test substance	:	as prescribed by 1.1 - 1.4
Method	:	Daphnia magna were continuously exposed to five mean measured concentrations of test substance ranging from 5.1 to 100 ug/l. A concurrent control group was included in the study. Dissolved oxygen concentration and temperature were measured daily, and total hardness and alkalinity were determined weekly. Aliquots of water were removed from each tanks weekly and analyzed by gas chromatography using a nitrogen-phosphorus specific detector. Fortified water samples were used in a recovery study to determine the percent recovery of the test substance from the water.
Result	:	Survival of daphnids exposed to 100 ug/l was significantly reduced when compared to survival of control daphnids when measured on days 14 and 21. Exposure concentrations as high as 40 ug/l had no effect on survival. The average number of offspring produced per daphnid exposed to 100 ug/l was significantly less than the number of offspring produced by control daphnids. Offspring production was unaffected among daphnids exposed to all other concentrations (40, 16, 8, 5 and <2 ug/l). The NOEC for mortality and reproduction was found to be 40 ug/l.
Reliability	:	(1) valid without restriction

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4.6.1 TOXICITY TO SOIL DWELLING ORGANISMS

4.6.2 TOXICITY TO TERRESTRIAL PLANTS

4.6.3 TOXICITY TO OTHER NON-MAMM. TERRESTRIAL SPECIES

4.7 BIOLOGICAL EFFECTS MONITORING

4.8 BIOTRANSFORMATION AND KINETICS

4.9 ADDITIONAL REMARKS

5.1.1 ACUTE ORAL TOXICITY

Type	:	other: Limit Test
Species	:	rat
Strain	:	Sprague-Dawley
Sex	:	male/female
Number of animals	:	10
Vehicle	:	other: Corn Oil
Value	:	> 5000 mg/kg bw
Method	:	EPA OTS 798.1175
Year	:	1979
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Method	:	The animals were fasted for 24 hours and then received the test substance via oral gavage. The animals were observed daily for 14 days for mortality and clinical signs of toxicity. They were then sacrificed and necropsied. Internal structures and organs were observed for gross lesions.
Result	:	There was no mortality. Signs of toxicity included depression, diarrhea, and stains on the fur and around the nose. The animals' behavior and appearance returned to normal by day 6. No gross abnormalities were observed at necropsy.
Conclusion	:	The acute oral LD50 for Phosflex 51B in rats is greater than 5000 mg/kg.
Reliability	:	(1) valid without restriction

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5.1.2 ACUTE INHALATION TOXICITY

Type	:	LC50
Species	:	rat
Strain	:	Sprague-Dawley
Sex	:	male/female
Number of animals	:	20
Vehicle	:	other: none
Exposure time	:	4 hour(s)
Value	:	> 3.1 mg/l
Method	:	EPA OPPTS 870.1300
Year	:	1979
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Remark	:	A group of 10 male and 10 female rats were exposed for 4 hours to an aerosol of Phosflex 51B at the highest attainable concentration, 3.1 mg/l. Aerosol concentration was determined from samples collected at the breathing zone of the rats during exposure. Analysis was by gas-liquid chromatography using a flame ionization detector. Aerosol particle size analysis was determined during the exposure period using a cascade impactor. Body weights were obtained on days 3, 7, and 14. Necropsies were performed on all animals.
Result	:	The 4 hour exposure to the highest attainable dose, 3.1 mg/l, produced no mortality. Particle size distribution ranged from 2.5 to 2.8 um. Ruffled fur was the only clinical sign of exposure. There was no effect on body weights. At necropsy, 1 female rat had reddened lungs and another female rat had whitish lungs. No other gross changes were noted.
Conclusion	:	The acute inhalation LC50 is greater than 3.1 mg/l. Phosflex 51B has relatively low toxicity by this route of exposure.
Reliability	:	(1) valid without restriction

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06.04.2001

5.1.3 ACUTE DERMAL TOXICITY

Type	:	other: Limit Test
Species	:	rabbit
Strain	:	New Zealand white
Sex	:	male/female
Number of animals	:	10
Vehicle	:	other: None
Value	:	> 2000 mg/kg bw
Method	:	EPA OTS 798.1100
Year	:	1979
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Method	:	The fur on 5 male and 5 female New Zealand White rabbits was closely clipped and the skin was abraded on half the animals. The skin on the other half of the animals was left intact. Phosflex 51B was applied neat at 2000 mg/kg to the clipped area. The animals were observed daily for 14 days following treatment. Necropsies were conducted on day 15 on all animals. Internal organs were examined for gross lesions.
Result	:	One of the ten animals died. Clinical signs included mild diarrhea and slight depression. No treatment-related lesions were observed during necropsy.
Conclusion	:	Phosflex 51B has low toxicity by the dermal route. The acute dermal LD50 is greater than 2000 mg/kg/day.
Reliability	:	(1) valid without restriction

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5.1.4 ACUTE TOXICITY, OTHER ROUTES

5.2.1 SKIN IRRITATION

Species	:	rabbit
Concentration	:	100 undiluted
Exposure	:	Occlusive
Exposure time	:	24 hour(s)
Number of animals	:	6
PDII	:	
Result	:	slightly irritating
EC classification	:	irritating
Method	:	EPA OTS 798.4470
Year	:	1979
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Method	:	The backs of six young adult rabbits were shaved and half the shaved areas were abraided 24 hours prior to dosing. Each animal received 0.5 ml of Phosflex 51B on the shaved area. The application sites were wrapped for 24 hours, then unwrapped at which time the remaining test substance was removed. The animals were observed for signs of skin irritation 24, 48, and 72 hours after treatment. The treated skin was evaluated for degree of irritation using the Draize scoring method.
Result	:	Mild to moderate erythema was observed 24 hours after treatment. No edema was observed. At 48 hours, mild erythema was still evident at 4 dose sites. There was no irritation present at the 72 hour observation period. The primary irritation score was 0.50 indicating that Phosflex 51B is a mild dermal irritant.

Conclusion	:	Phosflex 51B was a mild skin irritant in this test.
Reliability	:	(1) valid without restriction

30.05.2001 (23)

5.2.2 EYE IRRITATION

Species	:	rabbit
Concentration	:	100 undiluted
Dose	:	.1 ml
Exposure Time	:	.5 minute(s)
Comment	:	other: 3 rabbits had eyes flushed at 30 seconds, the eyes of the remaining 6 rabbits were not washed.
Number of animals	:	9
Result	:	slightly irritating
EC classification	:	irritating
Method	:	EPA OTS 798.4500
Year	:	1979
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Method	:	A dose of 0.1 ml of Phosflex 51B was placed in the everted lower left eyelid of 9 rabbits. The upper and lower lids were then held together for about one second. About 30 seconds after treatment, the treated eyes of 3 rabbits were gently flushed with water for about 1 minute. The treated eyes of the remaining 6 rabbits remained unwashed. The right eye of each rabbit served as an untreated control eye. Each treated eye was scored for irritation at 24, 48, 72, and 96 hours ad at 7 days after treatment. The eyes were scored for irritation according to the method of Draize.
Result	:	Mild redness of the conjunctiva was observed in two rabbits (one with washed eye, the other with unwashed eye) at the 24 hour observation. The two eyes cleared by 48 hours, but another eye (unwashed) showed mild redness of the conjunctiva at 48 hours. All eyes were clear of irritation at 72 hours and 96 hoours, and remained so through the 7 day observation. The average irritation scores at 24 and 48 hours were 0.44 and 0.22, respectively.
Conclusion	:	Phosflex 51B is a very mild eye irritant.
Reliability	:	(1) valid without restriction

02.08.2001 (22)

5.3 SENSITIZATION

5.4 REPEATED DOSE TOXICITY

Species	:	rat
Sex	:	male/female
Strain	:	Sprague-Dawley
Route of admin.	:	oral feed
Exposure period	:	3 months
Frequency of treatment	:	Daily
Post obs. period	:	None
Doses	:	100, 400, and 1600 ppm
Control group	:	yes, concurrent no treatment
NOAEL	:	= 400 ppm
LOAEL	:	= 1600 ppm
Method	:	EPA OTS 798.2650
Year	:	1981
GLP	:	yes
Method	:	This study consisted of four groups of rats, each group containing twenty

male and twenty female animals. One group was an untreated control group. The other groups received Phosflex 51B daily for three months blended into their diets, at dose of either 100, 400, or 1600 ppm. Parameters measured during the study include body weight, food consumption, daily clinical observations, hematology, clinical chemistry, and cholinesterase activity. All animals were necropsied at which time they were examined for gross changes. Their tissues were removed, processed, and examined via histopathology. The brain, heart, liver, kidneys, adrenals and ovaries or testes were weighed. The following organs were fixed in 10% neutral buffered formalin: sternum, lungs, trachea, heart, spleen, thymus, lymph nodes, salivary glands, esophagus, stomach, duodenum, jejunum, ilium, cecum, pancreas, liver, kidneys, urinary bladder, uterus, cervix, vagina, prostate, thyroid/parathyroid, brain. The ovaries, testes and epididymides, pituitary, adrenals, eyes, and hardarian glands were fixed in 2.5% buffered gluteraldehyde. All of the above tissues were examined microscopically for treatment related alterations.

Result : There were no treatment related effects on body weights, food consumption, hematology and clinical chemistry, or on cholinesterase values. Phosflex 51B treatment did not result in either gross or microscopic lesions or anomalies. There was a significant increase in the absolute and relative mean weights of livers in the high dose male rats, the mean relative liver weights of the high dose female animals, the mean kidney weights of the high dose male rats, and the mean absolute weights of the adrenal glands from the high dose female rats. While increases in specific absolute and/or relative organ weights in some animals, there was no corresponding increase in histopathological changes in these organs. No treatment-related alterations were seen in any of the treated animals. Since increased organ weights were observed in certain male and female rats that received the high dose, the NOEL in this study is 400 ppm.

Conclusion : Phosflex 51B demonstrated low systemic toxicity when administered daily in the feed to Sprague-Dawley rats for 90 days.

Reliability : (1) valid without restriction

30.05.2001 (16)

5.5 GENETIC TOXICITY 'IN VITRO'

Type : Ames test
System of testing : Salmonella typhimurium
Concentration : 0.005, 0.01, 0.1, 1.0, 5.0, and 10.0 ug/plate
Cycotoxic conc. : 0.1 ug and above
Metabolic activation : with and without
Result : negative
Method : EPA OTS 798.5265
Year : 1979
GLP : no
Test substance : as prescribed by 1.1 - 1.4
Method : Five tester strains of Salmonella typhimurium, TA-1535, TA-1537, TA-1538, TA-98, and TA-100, were exposed to Phosflex 51B in the presence and absence of a metabolic activating system. Positive control chemicals were included in the assay, as was a solvent (DMSO) and negative control group.

Result : The positive control chemicals significantly increased the number of revertants per plate, confirming that the assay was sensitive to, and responsive to, mutagenic chemicals. Phosflex 51B did not increase the number of revertants per plate and thus did not cause mutation in the test system, either in the presence or absence of a metabolic activating system.

Conclusion : Phosflex 51B did not express mutagenic activity in this test.

Reliability : (1) valid without restriction

02.08.2001 (9)

Type	:	Cytogenetic assay
System of testing	:	Mouse Lymphoma L5178Y cells
Concentration	:	0.625, 1.25, 2.50, 5.0, 10.0, and 20 nl/ml
Cycotoxic conc.	:	2.50 nl/ml
Metabolic activation	:	with and without
Result	:	negative
Method	:	EPA OTS 798.5900
Year	:	1979
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Method	:	Phosflex 51B was evaluated in the mouse lymphoma cytogenetic assay, in the presence and absence of a rat liver metabolic activating system, to determine if it can induce chromosomal aberrations and/or sister chromatid exchanges. A negative control, solvent control (DMSO), and positive control groups were included in the assay. Doses used in this assay were selected based on the results of a preliminary cytotoxicity assay.
Result	:	Phosflex 51B did not induce chromosomal aberrations or sister chromatid exchanges in this assay. The positive control chemicals induced a significant incidence of cytogenetic mutations, confirming the adequacy and sensitivity of this assay.
Conclusion	:	Phosflex 51B did not demonstrate mutagenic or genotoxic activity in this assay.
Reliability	:	(1) valid without restriction

02.08.2001 (8)

Type	:	Mammalian cell gene mutation assay
System of testing	:	Mouse Lymphoma L5178Y Cells
Concentration	:	0.975, 15.6, 31.3, 62.5 and 125 nl/ml
Cycotoxic conc.	:	15.6 nl/ml
Metabolic activation	:	with and without
Result	:	negative
Method	:	EPA OTS 798.5300
Year	:	1979
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Method	:	Phosflex 51B was evaluated for gene mutation in mouse lymphoma L5178Y cells in the presence and absence of a rat liver metabolic activating system. Negative control, solvent control (DMSO), positive controls and Phosflex 51B treated cells were cultured and evaluated for mutagenic activity. Doses used in this test were based on the results of a preliminary cytotoxicity test.
Result	:	Phosflex 51B did not induce gene mutations in mouse lymphoma L5178Y cells, either in the presence or absence of a metabolic activating system. The positive control chemicals indiced a significant increase in gene mutations, confirming the sensitivity of the assay.
Conclusion	:	Phosflex 51B did not demonstrate mutagenic activity in this assay.
Reliability	:	(1) valid without restriction

02.08.2001 (7)

5.6 GENETIC TOXICITY 'IN VIVO'

02.05.2001

5.7 CARCINOGENITY

5.8 TOXICITY TO REPRODUCTION

Type	:	other: Continuous Breeding Protocol
Species	:	rat
Sex	:	male/female
Strain	:	Fischer 344
Route of admin.	:	gavage
Exposure period	:	Up to 131 days
Frequency of treatment	:	Daily
Premating exposure period		
Male	:	7 days prior to pairing
Female	:	7 days prior to pairing
Duration of test	:	Up to 135 days
Doses	:	0.6, 1.0, and 1.7 g/kg/day in hydraulic fluid
Control group	:	other: concurrent vehicle control group and nontreated control group
NOAEL Parental	:	= 600 mg/kg bw
Method	:	other: Continuous Breeding Protocol
Year	:	1993
GLP	:	no
Test substance	:	other TS: hydraulic fluid containing butylated triphenyl phosphate
Remark	:	Milspec C, a hydraulic fluid containing butylated triphenyl phosphate manufactured to military specifications (i.e., "milspec"), was administered to male and female F-344 rats in an amount necessary to achieve doses of butylated triphenyl phosphate of either 600, 1000, or 1700 mg/kg/day. The mid and high dose female animals expressed decreased fertility, prolongated estrus cycle, and a decreased mating index. A significant decrease in body weight gain in both mid and high dose females throughout the study (and a 10% body weight loss in mid-dose females in the first week), suggesting significant systemic toxicity, may have been the primary cause of the decreased fertility. There were no significant effects on reproductive performance in the male animals. Since the other components of the Milspec hydraulic fluid were not specified, one cannot exclude the possibility that one or more components in the fluid, other than the butylated triphenyl phosphate, caused the decrease in fertility. Since the body weights of the mid dose females were significantly lower than the corresponding high dose animals from about day 10 through day 131, a dosing error cannot be ruled out (study not GLP).
Reliability	:	(3) invalid

02.08.2001 (6)

5.9 DEVELOPMENTAL TOXICITY/TERATOGENICITY

Species	:	rat
Sex	:	female
Strain	:	Sprague-Dawley
Route of admin.	:	gavage
Exposure period	:	Gestation days 6 through 20
Frequency of treatment	:	Daily
Duration of test	:	30 days
Doses	:	0, 100, 400, or 1000 mg/kg/day
Control group	:	yes, concurrent no treatment
NOAEL Maternalt.	:	= 400 mg/kg bw
NOAEL Teratogen	:	> 1000 mg/kg bw
Method	:	EPA OTS 798.4900
Year	:	1982
GLP	:	yes

Test substance	:	as prescribed by 1.1 - 1.4
Method	:	Thirty pregnant rats per group received either 0, 100, 400, or 1000 mg/kg/day of Phosflex 51B by oral gavage from gestation day 6 through gestation day 20. Animals were observed daily for signs of treatment-related effects. Body weights and food consumption were measured on study days 0, 6, 9, 12, 16 and 21. The pregnant animals were sacrificed on gestation day 21. They underwent necropsy and gross internal examination. The liver from each dam was weighed. The reproductive tract was removed,weighed, and examined. The uterus was examined for the number and distribution of fetuses and resorptions. Ovaries were examined for corpora lutea, which were counted. All fetuses were weighed, sexed, and examined for external malformations. One half of the fetuses of each litter were fixed and stained for skeletal examination and the other half were fixed for visceral examination.
Result	:	The dams expressed minimal clinical signs during treatment. In general, mean body weights of the treated rats were not significantly different from those of the control group. Five animals in the high dose group showed significantly reduced body weights between gestation days 6 - 16. The terminal body weights for these animals were not significantly different from control values. Food consumption was significantly reduced in the high dose animals. No treatment-related gross lesions were observed at necropsy. A significant increase in liver weights was observed in all treatment groups, showing a dose-response. This increase was considered an adaptive effect, rather than a toxic response to the chemical. Uterine weights were unaffected. There were no treatment-related effects on the number of corpora lutea, implants, resorption sites, or live fetuses per dam. Mean fetal weight for the high dose litters was significantly reduced by eight percent, a reduction most probably due to and secondary to maternal toxicity. There was no effect on litter size or fetal weights for the mid and low dose groups. There were no significant increases in external, soft tissue, or skeletal anomalies in any treatment group.
Conclusion	:	The increased absolute and relative liver weights observed in all three treatment groups was considered an adaptive response (i.e., enzyme induction) and not a treatment-related toxicity. Treatment with Phosflex 51B during gestation did not result in developmental toxicity (teratogenicity).
Reliability	:	(1) valid without restriction

02.08.2001 (17)

5.10 OTHER RELEVANT INFORMATION

Type	:	Neurotoxicity
Method	:	Fifteen adult White Leghorn hens received a 11.7 g/kg dose of Phosflex 51B at the start of the study and again 21 days later. A groups of 12 hens,comprising the negative (untreated) control group, received 10 ml/kg corn oil. Another group of 12 hens received two doses of 500 mg/kg of the positive control chemical, TOCP, 21 days apart. All hens were observed daily for clinical signs of neurotoxicity. Each hen was removed from its cage weekly and forced to walk on a horizontal surface to check for locomotor impairment. All hens were terminated 3 weeks after the second dose. The animals were terminated with sodium pentobarbital, infused with neurtral buffered formalin, and the brain, spinal cord, and sciatic nerves were removed for histopathologic examination. In addition to H&E staining, sections from each tissue specimen were stained with Luxol Fast Blue and counterstained with periodic Acid Schiff stain.
Result	:	All hens treated with Phosflex 51B or corn oil survived the entire study. Nine of the 12 TOCP treated hens survived. Body weights of the corn oil treated hens were not affectsed whereas the Phosflex 51B treated hens showed mild body weight loss. TOCP treated hens showed severe body weight loss. The clinical signs expressed by the Phosflex 51B treated hens

were very similar to those shown by the negative control animals. Most of the TOCP treated hens showed leg weakness beginning on days 13-16 that increased in severity through the remainder of the study. Ataxia was very evident in this positive control group. Gait was unaffected in the negative control and Phosflex 51B treated hens. All three groups showed a decrease in egg production through the study. Distinct neurohistological changes of a degenerative nature were observed only in the positive control group. These changes included axonal swelling or degeneration with myelin fragmentation. Examination of the central and peripheral nerves from the Phosflex 51B and negative control hens showed background changes in both groups that were very similar in type, incidence and degree. Phosflex 51B administered to hens at the very high dose of 11.7 g/kg did not cause neurotoxicity. There was no evidence of motor impairment or TOCP-like nerve lesions in the Phosflex 51B treated hens.

Reliability : (1) valid without restriction
25.07.2001 (18)

Type : Neurotoxicity
Method : Three groups of White Leghorn hens, each consisting of 4 adult animals, received a single oral gavage dose of either corn oil (10 ml/kg), TOCP (45 mg/kg), or Phosflex 51B (10 ml/kg). Twenty-four hours after dosing the animals were sacrificed and plasma cholinesterase activity and brain neurotoxic esterase (NTE) activity were measured.
Result : Both TOCP and Phosflex 51B produced significant inhibition of plasma cholinesterase activity. TOCP caused 47% inhibition whereas Phosflex 51B caused 56% inhibition of plasma cholinesterase activity. While TOCP inhibited NTE activity by 64%, Phosflex 51B did not inhibit NTE activity (0% inhibition). While Phosflex 51B caused cholinesterase inhibition at the very high dose of 10 ml/kg (11.7 g/kg!!), there is no evidence that the substance causes cholinesterase inhibition at significantly lower doses, which would be more representative of levels of human exposure. No inhibition of NTE activity indicates Phosflex 51B will not cause delayed peripheral neurotoxicity.
Reliability : (2) valid with restrictions
25.07.2001 (24)

Type : Neurotoxicity
Method : Durad 220B was evaluated for the potential to cause acute delayed neurotoxicity. Three groups of adult hens (9 hens per group) received a single oral dose of either Durad 220B (2 g/kg), tap water (1.7 g/kg) or TOCP (500 mg/kg). Brain and spinal cord neurotoxic esterase (NTE) activity and brain acetylcholinesterase activity was measured in 3 hens per group 48 hours after dosing. The remaining 6 hens per group were held through the 21 day observation period, sacrificed, at which time the brain, spinal cord, and peripheral nerves were removed from each animal for histopathological examination.
Result : No inhibition of brain or spinal cord NTE or brain acetylcholinesterase was observed in Durad 220B treated hens. None of the Durad 220B treated hens exhibied clinical signs of neurotoxicity during the 21 day observation period following dosing. In contrast, clinical signs of neurotoxicity were evident in the TOCP hens. Histopathologic examination of the nerves from Durad 220B treated hens did not reveal axonal degeneration whereas the hens that received TOCP had degenerative axonal changes. Thus Durad 220B did not produce neurotoxicity when administered at a dose of 2 g/kg.
Reliability : (2) valid with restrictions
25.07.2001 (5)

Type : Neurotoxicity
Method : A subchronic neurotoxicity study was conducted in adult White Leghorn hens to determine the neurotoxic potential of jet engine lubricants containing phosphate ester additives. Groups consisting of 20 animals

each were gavaged daily with 1g/kg of one of four blends of jet engine turbo oil containing 3% of either tricresyl phosphate, triphenylphosphorothionate, or butylated triphenyl phosphate, 5 days per week, for up to 13 weeks. Another group received 7.5 mg/kg/day of TOCP, the positive control chemical. The hens were observed for clinical signs of neurotoxicity. After 6 weeks 4 hens from each group were sacrificed and used to determine brain and spinal cord acetylcholinesterase and neurotoxic esterase (NTE) activity. At the end of 13 weeks 4 hens per group were used for brain acetylcholinesterase and NTE activity measurements while the remaining 12 hens per group underwent histopathologic examination of the brain, spinal cord, and sciatic and tibial nerves.

Result : TOCP treated hens showed a progressive worsening of clinical symptoms (i.e., ataxia, diarrhea) during the observation period and an inhibition of brain and spinal cord NTE activity of 50% and 43% after 6 weeks and 76% and 50% after 13 weeks. There were no significant decreases in brain or spinal cord NTE activity in lubricant treated hens after 6 weeks treatment. After 13 weeks, hens treated with lubricant containing 3% butylated triphenyl phosphate showed a 32% and 27% decrease in brain and spinal cord NTE activity, respectively. Brain and spinal cord acetylcholinesterase activity was not inhibited in the butylated triphenyl phosphate treated hens. No histological lesions indicative of delayed neuropathy were seen in any of the lubricant treated hens whereas TOCP induced lesions characteristic of organophosphate-induced delayed neuropathy. The authords conclude that lubricant oils containing up to 3% butylated triphenyl phosphate have low potential to cause neurotoxicity.

Reliability : (2) valid with restrictions
25.07.2001 (2)

5.11 EXPERIENCE WITH HUMAN EXPOSURE

29.05.2001

(1) Akzo Nobel Functional Chemicals data, May, 2001.

(2) Daughtrey, , W., Biles, R, Jortner, B., and Ehrich, M. Subchronic Delayed Neurotoxicity Evaluation of Jet Engine Lubricants Containing Phosphorus Aditives. Fundam. Appl. Toxicol. 32:244-249, 1996.

(3) E G & G Bionomics Aquatic Toxicology Laboratory Study No. BN78-1384328-3. The Chronic Toxicity of S-154 to the Water Flea (Daphnia magna). Conducted for Monsanto Company. 1979

(4) E G & G Bionomics Marine Research Laboratory Study No. BN-79-100. Toxicity of S-154 to the Freshwater Alga Selenastrum capricornutum. Conducted for Monsanto Company. 1979

(5) Kotkoskie, L.A., Freeman, C., Loeb, W., McConnell, R.F., and Weiner, M.L. Evaluation of the Acute Delayed Neurotoxicity of Durad 220B Triaryl Phosphate in the Domestic hen. The Toxicologist 12:280, 1992.

(6) Latendresse, J.R., Brooks, C.L., Flemming, C.D., and Capen, C.C. Reproductive Toxicity of Butylated Triphenyl Phosphate and Tricresyl Phosphate Fluids in F344 Rats. Fundam. Appl. Toxicol. 22:392-399, 1993.

(7) Litton Bionetics, Inc. Mutagenic Evaluation of Phosflex 51B Lot 4833 in the Mouse Lymphoma Forward Mutation Assay. Study conducted for Stauffer Chemical Company. 1979

(8) Litton Bionetics, Inc. Mutagenicity Evaluation of Phosflex 51B Lot 4833 in an in vitro Cytogenetic Assay Measuring Sister Chromatid Exchange and Chromosome Aberrations. Study conducted for Stauffer Chemical Company. 1979

(9) Litton Bionetics, Inc., Mutagenicity Evaluation of Phosflex 51B Lot 4833 in the Ames Salmonella Microsome Plate Test. Study conducted for Stauffer Chemical Company. 1979

(10) Material Safety Data Sheet, Akzo Nobel Functional Chemicals LLC, November 28, 2000.

(11) Monsanto Company Study No. 43-000-760.26-4383444. Santicizer 154 River Dei-away Biodegradation Rate Study. 1982

(12) Monsanto Company Study No. 43-000-760.26-4383444. Sunlight Photolysis Screening of Santicizer 154. 1981

(13) Saeger, V.W., Hicks, O., Kaley, R.G, Michael, P.R., Mieure, J.P., and Tucker, E.S. Environmental Fate of Selected Phosphate Esters. Environmental Science and Technology 13:840-844, 1979.

(14) Springborn Laboratories, Inc. Syn-O-Ad 8485 - Acute Toxicity to Mysids (Mysidopsis bahia) Under Static Conditions. Study conducted for Akzo Nobel Chemicals, 1996.

(15) Springborn Laboratories, Inc. Syn-O-Ad 8485 - Acute Toxicity to Sheepshead Minnow (Cyprinodon variegatus) Under Static-Renewal Conditions. Study conducted for Akzo Nobel Chemicals, 1996.

(16) Stauffer Chemical Company study No. T-10468. Three Month Subchronic Dietary Study with Phosflex 51B in Rats. 1981

(17) Stauffer Chemical Company study No. T-10808. A Teratology Study in CD Rats with Phosflex 51B. 1982

(18) Stauffer Chemical Company study No. T-6681. Acute Delayed neurotoxicity Study with Phosflex 51B in Adult hens. 1980a.

(19) Stauffer Chemical Company study No. T-6681. Acute Dermal Toxicity Study in Albino Rabbits. 1979

(20) Stauffer Chemical Company study No. T-6681. Acute Inhalation Toxicity of Phosflex 51B in Albino Rats. 1979

(21) Stauffer Chemical Company study No. T-6681. Acute Oral LD50 in Male and Female Rats. 1979.

(22) Stauffer Chemical Company study No. T-6681. Primary Eye Irritation Study with Phosflex 51B. 1979

(23) Stauffer Chemical Company study No. T-6681. Primary Skin Irritation Test with Phosflex 51B. 1979

(24) Stauffer Chemical Company study No. T-6681b. Neurotoxicity Evaluation of Phosflex 51B. 1980.

(25) Union Carbide Environmental Services Laboratory Study. The Acute Toxicity of Fyrquel GT to the Rainbow Trout. Conducted for Stauffer Chemical Company, 1979.

7.1 END POINT SUMMARY

7.2 HAZARD SUMMARY

7.3 RISK ASSESSMENT